



DEPARTMENT OF LABOR

Occupational Safety and Health Administration

[Docket No. OSHA-2012-0036]

Tully/OHL USA Joint Venture: Application for Permanent Variance and Interim Order; Grant of Interim Order; Request for Comments

AGENCY: Occupational Safety and Health Administration (OSHA), Labor.

ACTION: Notice of application for a permanent variance and interim order; grant of interim order; request for comments.

SUMMARY: This notice announces the application of Tully/OHL USA Joint Venture (“Tully” or “the applicant”) for a permanent variance from the provisions of the Occupational Safety and Health Administration (“OSHA” or “the Agency”) construction standard that regulate work in compressed air. In addition, the applicant requested an interim order based on the alternate conditions specified by its variance application. Based on its review of the application, including the alternate conditions, OSHA concludes that an interim order will provide Tully’s employees with the requisite protection while OSHA considers Tully’s application for a permanent variance. Therefore, OSHA is granting an interim order to the applicant subject to the conditions described in this notice. OSHA also invites the public to submit comments on the variance application.

DATES: Submit comments, information, documents in response to this notice, and requests for a hearing on or before [INSERT DATE 30 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER]. The interim order specified by this notice becomes effective on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: Submit comments by any of the following methods:

Electronically: Tender submissions electronically to the Federal eRulemaking Portal at <http://www.regulations.gov>. Follow the instructions online for making electronic submissions.

Facsimile: If submissions, including attachments, are not longer than ten (10) pages, commenters may fax them to the OSHA Docket Office at (202) 693-1648.

Regular or express mail, hand delivery, or messenger (courier) service: Tender submissions to the OSHA Docket Office, Docket No. OSHA-2012-0036, Technical Data Center, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-2625, Washington, DC 20210; telephone: (202) 693-2350 (TTY number: (877) 889-5627). Note that security procedures may result in significant delays in receiving submissions sent by regular mail. Contact the OSHA Docket Office for information about security procedures concerning delivery of materials by regular or express mail, hand delivery, or messenger (courier) service. The hours of operation for the OSHA Docket Office are 8:15 a.m. - 4:45 p.m., e.t.

Instructions: All submissions must include the Agency name and the OSHA docket number (OSHA-2012-0036). OSHA places comments and other materials, including any personal information, in the public docket without revision, and these materials may be available online at <http://www.regulations.gov>. Therefore, the Agency cautions commenters about submitting statements they do not want made available to the public, or submitting comments that contain personal information (either about themselves or others) such as Social Security numbers, birth dates, and medical data.

Docket: To read or download submissions or other material in the docket, go to <http://www.regulations.gov> or to the OSHA Docket Office at the address above. The <http://www.regulations.gov> index lists all documents in the docket; however, some information (e.g., copyrighted material) is not publicly available to read or download through this website. All submissions, including copyrighted material, are available for inspection and copying at the OSHA Docket Office.

FOR FURTHER INFORMATION CONTACT: Information regarding this notice is available from the following sources:

Press inquiries: Contact Mr. Frank Meilinger, Director, OSHA Office of Communications, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-3647, Washington, DC 20210; telephone: (202) 693-1999; email: Meilinger.francis2@dol.gov.

General and technical information: Contact David Johnson, Director, Office of Technical Programs and Coordination Activities, Directorate of Technical Support and Emergency Management, Occupational Safety and Health Administration, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-3655, Washington, DC 20210; telephone: (202) 693-2110; email: johnson.david.w@dol.gov. OSHA's web page includes information about the Variance Program (see <http://www.osha.gov/dts/otpca/variances/index.html>).

SUPPLEMENTARY INFORMATION:

Copies of this Federal Register notice. Electronic copies of this Federal Register notice are available at <http://www.regulations.gov>. This Federal Register notice, as well

as news releases and other relevant information, also are available at OSHA's webpage at <http://www.osha.gov>.

Hearing requests. According to 29 CFR 1905.15, hearing requests must include: (1) a short and plain statement detailing how the variance would affect the requesting party; (2) a specification of any statement or representation in the variance application that the commenter denies, and a concise summary of the evidence adduced in support of each denial; and (3) any views or arguments on any issue of fact or law presented in the variance application.

I. Notice of Application

On July 12, 2012, Tully/OHL USA Joint Venture (hereafter, "Tully" or "the applicant"), 355 Front Street, Construction Site, Staten Island, NY 10304, submitted under Section 6(d) of the Occupational Safety and Health Act of 1970 ("OSH Act"; 29 U.S.C. 655) and 29 CFR 1905.11 ("Variances and other relief under section 6(d)") an application for a permanent variance from several provisions of the OSHA standard that regulates work in compressed air at 29 CFR 1926.803, as well as a request for an interim order pending OSHA's decision on the application for a variance (Ex. OSHA-2012-0036-0001). Specifically, Tully seeks a variance from the provisions of the standard that: (1) prohibit compressed-air worker exposure to pressures exceeding 50 pounds per square inch (p.s.i.) except in an emergency (29 CFR 1926.803(e)(5));¹ (2) require the use of the decompression values specified in decompression tables in Appendix A of the compressed-air standard for construction (29 CFR 1926.803(f)(1)); and (3) require the

¹The decompression tables in Appendix A of subpart S express the maximum working pressures as pounds per square inch gauge (p.s.i.g.), with a maximum working pressure of 50 p.s.i.g. Therefore, throughout this notice, OSHA expresses the 50 p.s.i. value specified by §1926.803(e)(5) as 50 p.s.i.g., consistent with the terminology in Appendix A, Table 1 of subpart S.

use of automated operational controls and a special decompression chamber (29 CFR 1926.803(g)(1)(iii) and .803(g)(1)(xvii), respectively).

Tully is a contractor that works on complex tunnel projects using recently developed equipment and procedures for soft-ground tunneling. Tully workers engage in the construction of subaqueous tunnels using advanced shielded mechanical excavation techniques in conjunction with an Earth Pressure Balanced Tunnel Boring Machine (EPBTBM).

According to its application, Tully is currently the managing partner of Tully/OHL USA Joint Venture, the general contractor for the New York Economic Development Corporation's New York Siphon Tunnel Project. The project consists of a 12-foot diameter tunnel beneath New York Harbor between Staten Island and Brooklyn. Tully will bore the tunnel below the water table through soft soils consisting of clay, silt, and sand. Tully would employ specially trained personnel for the construction of the tunnel, and states that this construction will use shielded mechanical-excavation techniques. Tully asserts that its workers would perform hyperbaric interventions at pressures greater than 50 p.s.i.g. in the excavation chamber of the EPBTBM; these interventions consist of conducting inspections and maintenance work on the cutter-head structure and cutting tools of the EPBTBM.

Tully asserts that innovations in tunnel excavation, specifically with EPBTBMs, have, in most cases, eliminated the need to pressurize the entire tunnel. This technology negates the requirement that all members of a tunnel-excavation crew work in compressed air while excavating the tunnel. These advances in technology modified substantially the methods used by the construction industry to excavate subaqueous

tunnels compared to the caisson work regulated by the current OSHA compressed-air standard for construction at 29 CFR 1926.803. Such advances reduce the number of workers exposed, and the total duration of exposure, to hyperbaric pressure during tunnel construction.

Using shielded mechanical-excavation techniques, in conjunction with precast concrete tunnel liners and backfill grout, EPBTBMs provide methods to achieve the face pressures required to maintain a stabilized tunnel face through various geologies, and isolate that pressure to the forward section (the working chamber) of the EPBTBM. Interventions in the working chamber (the pressurized portion of the EPBTBM) take place only after halting tunnel excavation and preparing the machine and crew for an intervention. Interventions occur to inspect or maintain the mechanical-excavation components located in the working chamber. Maintenance conducted in the working chamber includes changing replaceable cutting tools and disposable wear bars, and, in rare cases, repairing structural damage to the cutter head.

In addition to innovations in tunnel-excavation methods, Tully asserts that innovations in hyperbaric medicine and technology improve the safety of decompression from hyperbaric exposures. According to Tully, the use of decompression protocols incorporating oxygen is more efficient, effective, and safer for tunnel workers than compliance with the decompression tables specified by the existing OSHA standard (29 CFR part 1926, subpart S, Appendix A decompression tables). These hyperbaric exposures are possible due to advances in technology, a better understanding of hyperbaric medicine, and the development of a project-specific Hyperbaric Operations Manual (HOM) that requires specialized medical support and hyperbaric supervision to

provide assistance to a team of specially trained man-lock attendants and hyperbaric or compressed-air workers.

OSHA initiated a preliminary technical review of the Tully's variance application and developed a set of follow-up questions that it sent to Tully on August 29, 2012 (Ex. OSHA-2012-0036-0002). On October 9, 2012, Tully submitted its response and a request for an interim order (Ex. OSHA-2012-0036-0003). In its response to OSHA's follow-up questions, Tully indicated that the maximum pressure to which it is likely to expose workers during interventions for the New York Economic Development Corporation's New York Siphon Tunnel Project is 58 p.s.i.g. Therefore, to work effectively on this project, Tully must perform hyperbaric interventions in compressed air at pressures higher than the maximum pressure specified by in the existing OSHA standard, 29 CFR 1926.803(e)(5), which states: "No employee shall be subjected to pressure exceeding 50 p.s.i.g. except in emergency" (see footnote 1 in this notice).

II. The Variance Application

A. Background

The applicant asserts that the advances in tunnel excavation technology described in Section I of this notice modified significantly the equipment and methods used by contractors to construct subaqueous tunnels, thereby making several provisions of OSHA's compressed-air standard for construction at 29 CFR 1926.803 inappropriate for this type of work. These advances reduce both the number of employees exposed, and the total duration of exposure, to the hyperbaric conditions associated with tunnel construction.

Using shielded mechanical-excavation techniques, in conjunction with pre-cast concrete tunnel liners and backfill grout, EPBTBMs provide methods to achieve the face

pressures required to maintain a stabilized tunnel face, through various geologies, while isolating that pressure to the forward section (working or excavation chamber) of the EPBTBM.

Interventions involving the working chamber (the pressurized chamber at the head of the EPBTBM) would take place only after the applicant halts tunnel excavation and prepares the machine and crew for an intervention. Interventions occur to inspect or maintain the mechanical-excavation components located in the forward portion of the working chamber. Maintenance conducted in the forward portion of the working chamber includes changing replaceable cutting tools, disposable wear bars, and, in rare cases, repairs to the cutter head due to structural damage.

In addition to innovations in tunnel-excavation methods, research conducted after OSHA published its compressed-air standard for construction in 1971 resulted in advances in hyperbaric medicine. In this regard, the applicant asserts that the use of decompression protocols incorporating oxygen is more efficient, effective, and safer for tunnel workers than compliance with the existing OSHA standard (29 CFR part 1926, subpart S, Appendix A decompression tables). According to the applicant, contractors routinely and safely expose employees performing interventions in the working chamber of EPBTBMs to hyperbaric pressures up to 75 p.s.i.g., which is 50% higher than maximum pressure specified by the existing OSHA standard (see 29 CFR 1926.803(e)(5)). The applicant asserts that these hyperbaric exposures are possible because of advances in hyperbaric technology, a better understanding of hyperbaric medicine, and the development of a project-specific HOM (Hyperbaric Operations

Manual) that requires specialized medical support and hyperbaric supervision to provide assistance to a team of specially trained man-lock attendants and hyperbaric workers.

The applicant contends that a permanent variance would provide its workers with a place of employment that is at least as safe and healthful as they would obtain under the existing provisions of OSHA's compressed-air standard for construction. The applicant certifies that it provided employee representatives of affected workers² with a copy of the variance application. The applicant also certifies that it notified its workers of the variance application by posting, at prominent locations where it normally posts workplace notices, a summary of the application and information specifying where the workers can examine a copy of the application. In addition, the applicant informed its workers and their representatives of their rights to petition the Assistant Secretary of Labor for Occupational Safety and Health for a hearing on the variance application.

B. Variance from Paragraph (e)(5) of 29 CFR 1926.803, Prohibition of Exposure to Pressure Greater than 50 p.s.i.g. (see footnote 1 in this notice)

The applicant states that it may perform hyperbaric interventions at pressures greater than 50 p.s.i.g. in the working chamber of the EPBTBM; this pressure exceeds the pressure limit of 50 p.s.i.g. specified for nonemergency purposes by 29 CFR 1926.803(e)(5). The EPBTBM has twin man locks, with each man lock having two compartments. This configuration allows workers to access the man locks for compression and decompression, and medical personnel to access the man locks if required in an emergency.

²See the definition of "Affected employee or worker" below in section V. D of this notice.

EPBTBMs are capable of maintaining pressure at the tunnel face, and stabilizing existing geological conditions, through the controlled use of propel cylinders, a mechanically driven cutter head, bulkheads within the shield, ground-treatment foam, and a screw conveyor that moves excavated material from the working chamber. As noted earlier, the forward-most portion of the EPBTBM is the working chamber, and this chamber is the only pressurized segment of the EPBTBM. Within the shield, the working chamber consists of two sections: the staging chamber and the forward working chamber. The staging chamber is the section of the working chamber between the man-lock door and the entry door to the forward working chamber. The forward working chamber is immediately behind the cutter head and tunnel face.

The applicant will pressurize the working chamber to the level required to maintain a stable tunnel face. Pressure in the staging chamber ranges from atmospheric (no increased pressure) to a maximum pressure equal to the pressure in the working chamber. The applicant asserts that most of the hyperbaric interventions will be around 14.7 p.s.i.g. Nevertheless, the applicant maintains that they may have to perform interventions at pressures up to 58 p.s.i.g.

During interventions, workers enter the working chamber through one of the twin man locks that open into the staging chamber. To reach the forward part of the working chamber, workers pass through a door in a bulkhead that separates the staging chamber from the forward working chamber. The maximum crew size allowed in the forward working chamber is three. At certain hyperbaric pressures (i.e., when decompression times are greater than work times), the twin man locks allow for crew rotation. During crew rotation, one crew can be compressing or decompressing while the second crew is

working. Therefore, the working crew always has an unoccupied man lock at its disposal.

The applicant developed and proposes to use a project-specific HOM (Ex. OSHA-2012-0036-0004) that describes in detail the hyperbaric procedures and required medical examinations used during the tunnel-construction project. The HOM is project specific, and discusses standard operating procedures and emergency and contingency procedures. The procedures include using experienced and knowledgeable man-lock attendants who have the training and experience necessary to recognize and treat decompression sickness and diving-related illnesses and injuries. The attendants are under the direct supervision of the hyperbaric supervisor and attending physician. In addition, procedures include medical screening and review of prospective compressed-air workers (CAWs). The purpose of this screening procedure is to vet prospective CAWs with medical conditions (e.g., deep vein thrombosis, poor vascular circulation, and muscle cramping) that could be aggravated by sitting in a cramped space (e.g., a man lock) for extended periods or by exposure to elevated pressures and compressed gas mixtures. A transportable recompression chamber (shuttle) will be available to extract workers from the hyperbaric working chamber for emergency evacuation and medical treatment; the shuttle attaches to the topside medical lock, which is a large recompression chamber. The applicant believes that the procedures included in the HOM provide safe work conditions when interventions are necessary, including interventions above 50 p.s.i.g.

C. Variance from Paragraph (f)(1) of 29 CFR 1926.803, Requirement to Use OSHA
Decompression Tables

OSHA's compressed-air standard for construction requires decompression in accordance with the decompression tables in Appendix A of 29 CFR part 1926, subpart S (see 29 CFR 1926.803(f)(1)). As an alternative to the OSHA decompression tables, the applicant proposes to use newer decompression schedules that supplement breathing air used during decompression with pure oxygen. The applicant asserts that these decompression protocols are safer for tunnel workers than the decompression protocols specified in Appendix A of 29 CFR part 1926, subpart S. Accordingly, the applicant proposes to use the 1992 French Decompression Tables to decompress CAWs after they exit the hyperbaric conditions in the working chamber.

Depending on the maximum working pressure and exposure times, the 1992 French Decompression Tables provide for air decompression with or without oxygen. Tully asserts that oxygen decompression has many benefits, including reducing decompression time by about 33 percent, and significantly lowering the rate of decompression illness (DCI), compared to the air-decompression tables in Appendix A of 29 CFR part 1926, subpart S. In addition, the HOM requires a physician certified in hyperbaric medicine to manage the medical condition of CAWs during hyperbaric exposures and decompression. A trained and experienced man-lock attendant also will be present during hyperbaric exposures and decompression. This man-lock attendant will operate the hyperbaric system to ensure compliance with the specified decompression table. A hyperbaric supervisor (competent person), trained in hyperbaric operations, procedures, and safety,

will directly oversee all hyperbaric interventions, and ensure that staff follow the procedures delineated in the HOM or by the attending physician.

The applicant asserts that at higher hyperbaric pressures, decompression times exceed 75 minutes. The HOM establishes protocols and procedures that provide the basis for alternate means of protection for CAWs under these conditions. Accordingly, based on these protocols and procedures, the applicant requests to use the 1992 French Decompression Tables for hyperbaric interventions up to 58 p.s.i.g. for the New York Siphon Tunnel Project. The applicant will follow the decompression procedures described in the project-specific HOM during these interventions.

D. Variance from Paragraph (g)(1)(iii) of 29 CFR 1926.803, Automatically Regulated Continuous Decompression

According to the applicant, breathing air under hyperbaric conditions increases the amount of nitrogen gas dissolved in a CAW's tissues. The greater the hyperbaric pressure under these conditions, and the more time spent under the increased pressure, the greater the amount of nitrogen gas dissolved in the tissues. When the pressure decreases during decompression, tissues release the dissolved nitrogen gas into the blood system, which then carries the nitrogen gas to the lungs for elimination through exhalation. Releasing hyperbaric pressure too rapidly during decompression can increase the size of the bubbles formed by nitrogen gas in the blood system, resulting in DCI, commonly referred to as "the bends." This description of the etiology of DCI is consistent with current scientific theory and research on the issue (see footnote 8 below discussing a 1985 NIOSH report on DCI).

The 1992 French Decompression Tables proposed for use by the applicant provide for stops during worker decompression (i.e., staged decompression) to control the release of nitrogen gas from tissues into the blood system. Studies show that staged decompression, in combination with other features of the 1992 French Decompression Tables such as the use of oxygen, result in a lower incidence of DCI than the OSHA decompression requirements of 29 CFR 1926.803, which specify the use of automatically regulated continuous decompression (see footnotes 5 through 10 below for references to these studies).³ In addition, the applicant asserts that staged decompression is at least as effective as an automatic controller in regulating the decompression process because:

A. A hyperbaric supervisor (a competent person experienced and trained in hyperbaric operations, procedures, and safety) directly supervises all hyperbaric interventions and ensures that the man-lock attendant, who is a competent person in the manual control of hyperbaric systems, follows the schedule specified in the decompression tables, including stops; and

B. The use of the 1992 French Decompression Tables for staged decompression offers an equal or better level of management and control over the decompression process than an automatic controller and results in lower occurrences of DCI.

³In the study cited in footnote 6, starting at page 338, Dr. Eric Kindwall notes that the use of automatically regulated continuous decompression in the Washington State safety standards for compressed-air work (from which OSHA derived its decompression tables) was at the insistence of contractors and the union, and against the advice of the expert who calculated the decompression table, who recommended using staged decompression. Dr. Kindwall then states, "Continuous decompression is inefficient and wasteful. For example, if the last stage from 4 psig . . . to the surface took 1 h, at least half the time is spent at pressures less than 2 psig . . . , which provides less and less meaningful bubble suppression" In addition, the report referenced in footnote 5 under the section titled "Background on the Need for Interim Decompression Tables" addresses the continuous-decompression protocol in the OSHA compressed-air standard for construction, noting that "[a]side from the tables for saturation diving to deep depths, no other widely used or officially approved diving decompression tables use straight line, continuous decompressions at varying rates. Stage decompression is usually the rule, since it is simpler to control."

Accordingly, the applicant is applying for a permanent variance from the OSHA standard at 29 CFR 1926.803(g)(1)(iii), which requires automatic controls to regulate decompression. As noted above, the applicant will conduct the staged decompression according to the 1992 French Decompression Tables under the direct control of the trained man-lock attendant and under the oversight of the hyperbaric supervisor.

E. Variance from Paragraph (g)(1)(xvii) of 29 CFR 1926.803, Requirement of Special Decompression Chamber

The OSHA compressed-air standard for construction requires employers to use a special decompression chamber when total decompression time exceeds 75 minutes (see 29 CFR 1926.803(g)(1)(xvii)). Another provision of OSHA's compressed-air standard calls for locating the special decompression chamber adjacent to the man lock on the atmospheric pressure side of the tunnel bulkhead (see 29 CFR 1926.803(g)(2)(vii)). However, since only the working chamber of the EPBTBM is under pressure, and only a few workers out of the entire crew are exposed to hyperbaric pressure, the man locks (which, as noted earlier, connect directly to the working chamber) are of sufficient size to accommodate the exposed workers. In addition, available space in the EPBTBM does not allow for an additional special decompression lock. Again, the applicant uses the man locks, each of which will adequately accommodate a three-member crew, for this purpose when decompression lasts up to 75 minutes. When decompression exceeds 75 minutes, crews can open the door connecting the two compartments in each man lock during decompression stops or exit the man lock and move into the staging chamber where additional space is available. This alternative will enable CAWs to move about and flex their joints to prevent neuromuscular problems during decompression.

F. Multi-State Variance

Tully only applied for an interim order and variance for one site, the New York Siphon Tunnel Project, so any variance OSHA grants Tully will have effect only in the State of New York. While the State of New York has an OSHA-approved safety and health program, that program covers only public-sector employers and not private-sector employers such as Tully; therefore, Federal OSHA continues to cover private-sector employers in the State of New York.

III. Description of the Conditions Specified by the Interim Order and the Application for a Permanent Variance

This section describes the conditions that comprise the alternative means of compliance with 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii). These conditions form the basis of the interim order and Tully's application for a permanent variance.⁴

Condition A: Scope

The scope of the interim order/permanent variance limits/would limit coverage of the conditions of the interim order/permanent variance to the work situations specified under this condition. Clearly defining the scope of the interim order/permanent variance provides Tully, Tully's employees, and OSHA with necessary information regarding the work situations in which the interim order/permanent variance applies/would apply.

Condition B: Application

⁴In these conditions, the present tense form of the verb (e.g., "must") pertains to the interim order, while the future conditional form of the verb (e.g., "would") pertains to the application for a permanent variance (designated as "permanent variance").

This condition specifies the circumstances under which the interim order/permanent variance is/would be in effect, notably only for hyperbaric work performed during interventions. The condition places clear limits on the circumstances under which the applicant can expose its employees to hyperbaric pressure.

Condition C: List of Abbreviations

Condition C defines/would define a number of abbreviations used in the interim order/permanent variance. OSHA believes that defining these abbreviations will serve to clarify and standardize their usage, thereby enhancing the applicant's and its employees' understanding of the conditions specified by the interim order/permanent variance.

Condition D: Definitions

The condition defines/would define a series of terms, mostly technical terms, used in the interim order/permanent variance to standardize and clarify their meaning. Defining these terms will enhance the applicant's and its employees' understanding of the conditions specified by the interim order/permanent variance.

Condition E: Safety and Health Practices

This condition requires/would require the applicant to develop and submit to OSHA a project-specific HOM at least six months before using the EPBTBM for tunneling operations. This requirement ensures/would ensure that the applicant develops hyperbaric safety and health procedures suitable for each specific project. The HOM enables/would enable OSHA to determine that the specific safety and health instructions and measures specified by the HOM are/would be appropriate and will/would adequately protect the safety and health of the CAWs, and, if found appropriate, enables/would enable OSHA to enforce these instructions and measures. Additionally, the condition

includes/would include a series of related hazard prevention and control requirements and methods (e.g., decompression tables, job hazard analyses (JHA), operations and inspections checklists) designed to ensure the continued effective functioning of the hyperbaric equipment and operating system.

Condition F: Communication

Condition F requires/would require the applicant to develop and implement an effective system of information sharing and communication. Effective information sharing and communication will/would ensure that affected workers receive updated information regarding any safety-related hazards and incidents, and corrective actions taken, prior to the start of each shift. The condition also requires/would require the applicant to ensure that reliable means of emergency communications are/would be available and maintained for affected workers and support personnel during hyperbaric operations, which will/would enable affected workers and support personnel to respond quickly and effectively to hazardous conditions that may develop during EPBTBM operations.

Condition G: Worker Qualification and Training

This condition requires/would require the applicant to develop and implement an effective qualification and training program for affected workers. The condition specifies/would specify the factors that an affected worker must know to perform safely during hyperbaric operations, including how to enter, work in, and exit from hyperbaric conditions under both normal and emergency conditions. Having well-trained and qualified workers performing hyperbaric intervention work will/would ensure that they recognize, and respond appropriately to, hyperbaric safety and health hazards. These

qualification and training requirements will/would enable affected workers to cope effectively with emergencies, as well as the discomfort and physiological effects of hyperbaric exposure, thereby preventing injury, illness, and fatalities among the workers.

Paragraph (2)(e) of this condition also requires/would require the applicant to provide affected workers with information the workers can use to contact the appropriate healthcare professionals should the workers believe they may be developing hyperbaric-related health effects from their exposure to hyperbaric conditions. This requirement will/would provide for early intervention and treatment of DCI and other health effects resulting from hyperbaric exposure, thereby reducing the severity of these effects.

Condition H: Inspections, Tests, and Accident Prevention

Condition H requires/would require the applicant to develop, implement, and operate a program of frequent and regular inspections of the EPBTBM's hyperbaric equipment and support systems, and associated work areas. This condition will/would help ensure the safe operation and physical integrity of the equipment and work areas necessary to conduct hyperbaric operations, thereby enhancing worker safety by reducing the risk of a hyperbaric-related emergency.

Paragraph (3) of this condition requires/would require the applicant to document tests, inspections, corrective actions, and repairs involving the EPBTBM, and maintain these documents at the job site for the duration of the job. This requirement will/would provide the applicant with information needed to schedule tests and inspections to ensure the continuing safe operation of the equipment and systems, and to determine that the actions taken to correct defects in hyperbaric equipment and systems were appropriate, prior to returning them to service.

Condition I: Compression and Decompression

This condition requires/would require the applicant to consult with its designated medical advisor regarding special compression or decompression procedures appropriate for any unacclimated CAW. This provision will/would ensure that the applicant consults with the medical advisor, and involves the medical advisor in the evaluation, development, and implementation of compression or decompression protocols appropriate for any CAW requiring acclimation to the hyperbaric conditions encountered during EPBTBM operations. Accordingly, CAWs requiring acclimation to the hyperbaric conditions in the EPBTBM will/would have an opportunity to acclimate prior to exposure to these conditions. OSHA believes this condition will/would prevent or reduce adverse reactions among CAWs to the effects of compression or decompression associated with the intervention work they perform in the EPBTBM.

Condition J: Recordkeeping

Condition J requires/would require the applicant to maintain records of specific factors associated with each hyperbaric intervention. The information gathered and recorded under this provision, in concert with the information provided under Condition K, will/would enable the applicant and OSHA to determine the effectiveness of the interim order/permanent variance in preventing DCI and other hyperbaric-related effects.

Proposed Condition K: Notifications

Under this condition, the applicant must/would, within specified periods, notify OSHA of any employee injuries, illnesses, or fatalities that occur as a result of hyperbaric exposures during EPBTBM operations; provide OSHA with a copy of the incident investigation of these events that includes information on the root-cause determination,

and preventive and corrective actions identified and implemented by the applicant; and certify that it informed affected workers of the incident and the results of the incident investigation. This condition also requires/would require the applicant to: notify OTPCA and the Manhattan Area Office within 15 working days should the applicant need to revise its HOM to accommodate changes in its compressed-air operations that affect/would affect its ability to comply with the conditions of the interim order/permanent variance; and provide OTPCA and the Manhattan Area Office, at the end of the New York Siphon Tunnel Project, with a report evaluating the effectiveness of the decompression tables.

These notification requirements will/would enable the applicant, its employees, and OSHA to determine the effectiveness of the interim order/permanent variance in providing the requisite level of safety to the applicant's workers and, based on this determination, whether to revise or revoke the conditions of the interim order/permanent variance. Timely notification will/would permit OSHA to take whatever action may be necessary and appropriate to prevent further casualties, while providing notification to employees will/would inform them of the precautions taken by the applicant to prevent similar incidents in the future.

This condition also requires/would require the applicant to notify OSHA if it ceases to do business, has a new address or location for its main office, or transfers the operations covered by the interim order/permanent variance to a successor company. In addition, the condition specifies/would specify that OSHA must approve the transfer of the interim order/permanent variance to a successor company. These requirements will/would allow OSHA to communicate effectively with the applicant regarding the

status of the interim order/permanent variance, and expedite the Agency's administration and enforcement of the interim order/permanent variance. Stipulating that an applicant must have OSHA's approval to transfer a variance to a successor company will/would provide assurance that the successor company has knowledge of, and will/would comply with, the conditions specified by the interim order/permanent variance, thereby ensuring the safety of workers involved in performing the operations covered by the interim order/permanent variance.

IV. Grant of Interim Order

As noted earlier, the applicant requested an interim order that would remain in effect until completion of the New York Siphon Tunnel Project, or until the Agency makes a decision on its application for a permanent variance. During this period, the applicant will fully comply with the conditions of the interim order as an alternative to complying with the requirements of 29 CFR 1926.803 (hereafter, "the standard") that:

A. Prohibit employers using compressed air under hyperbaric conditions from subjecting workers to pressure exceeding 50 p.s.i.g., except in emergency (29 CFR 1926.803(e)(5));

B. Require the use of decompression values specified by the decompression tables in Appendix A of the compressed-air standard (29 CFR 1926.803(f)(1)); and

C. Require the use of automated operational controls and a special decompression chamber (29 CFR 1926.803(g)(1)(iii) and .803(g)(1)(xvii), respectively).

After reviewing the application, OSHA preliminarily determined that:

A. Tully developed, and proposed to implement, effective alternative measures to the prohibition of using compressed air under hyperbaric conditions exceeding 50 p.s.i.g.

The proposed alternative measures include use of engineering and administrative controls

of the hazards associated with work performed in compressed-air conditions exceeding 50 p.s.i.g. while engaged in the construction of a subaqueous tunnel using advanced shielded mechanical-excavation techniques in conjunction with an EPBTBM. Prior to conducting interventions in the EPBTBM's pressurized working chamber, the applicant halts tunnel excavation and prepares the machine and crew to conduct the interventions. Interventions involve inspection, maintenance, or repair of the mechanical-excavation components located in the working chamber.

B. Tully developed, and proposed to implement, safe hyperbaric work procedures, emergency and contingency procedures, and medical examinations for the project's CAWs. The applicant compiled these standard operating procedures into a project-specific HOM. The HOM discusses the procedures and personnel qualifications for performing work safely during the compression and decompression phases of interventions. The HOM also specifies the decompression tables the applicant proposes to use. Depending on the maximum working pressure and exposure times during the interventions, the tables provide for decompression using air, pure oxygen, or a combination of air and oxygen. The decompression tables also include delays or stops for various time intervals at different pressure levels during the transition to atmospheric pressure (i.e., staged decompression). In all cases, a physician certified in hyperbaric medicine will manage the medical condition of CAWs during decompression. In addition, a trained and experienced man-lock attendant, experienced in recognizing decompression sickness or illnesses and injuries, will be present. Of key importance, a hyperbaric supervisor (competent person), trained in hyperbaric operations, procedures,

and safety, will directly supervise all hyperbaric operations to ensure compliance with the procedures delineated in the project-specific HOM or by the attending physician.

C. Tully developed, and proposed to implement, a training program to instruct affected workers in the hazards associated with conducting hyperbaric operations.

D. Tully developed, and proposed to implement, an effective alternative to the use of automatic controllers that continuously decrease pressure to achieve decompression in accordance with the tables specified by the standard. The alternative includes using the 1992 French Decompression Tables for guiding staged decompression to achieve lower occurrences of DCI, using a trained and competent attendant for implementing appropriate hyperbaric entry and exit procedures, and providing a competent hyperbaric supervisor, and attending physician certified in hyperbaric medicine, to oversee all hyperbaric operations.

E. Tully developed, and proposed to implement, an effective alternative to the use of the special decompression chamber required by the standard. EPBTBM technology permits the tunnel's work areas to be at atmospheric pressure, with only the face of the EPBTBM (i.e., the working chamber) at elevated pressure. The applicant limits interventions conducted in the working chamber to performing required inspection, maintenance, and repair of the cutting tools on the face of the EPBTBM. The EPBTBM's man lock and working chamber provide sufficient space for the maximum crew of three CAWs to stand up and move around, and safely accommodate decompression times up to 360 minutes. Therefore, OSHA preliminarily determined that the EPBTBM's man lock and working chamber function as effectively as the special decompression chamber required by the standard.

OSHA conducted a review of the scientific literature regarding decompression to determine whether the alternative decompression method (i.e., the 1992 French Decompression Tables) the applicant proposed would provide a workplace as safe and healthful as that provided by the standard. Based on this review, OSHA preliminarily determined that tunneling operations performed with these tables⁵ result in a lower occurrence of DCI than the decompression tables specified by the standard.^{6,7,8}

The review conducted by OSHA found several research studies supporting the determination that the 1992 French Decompression Tables result in a lower rate of DCI than the decompression tables specified by the standard. For example, H. L. Anderson studied the occurrence of DCI at maximum hyperbaric pressures ranging from 4 p.s.i.g. to 43 p.s.i.g. during construction of the Great Belt Tunnel in Denmark (1992-1996);⁹ this project used the 1992 French Decompression Tables to decompress the workers during

⁵In 1992, the French Ministry of Labour replaced the 1974 French Decompression Tables with the 1992 French Decompression Tables, which differ from OSHA's decompression tables in Appendix A by using: (1) staged decompression as opposed to continuous (linear) decompression; (2) decompression tables based on air or both air and pure oxygen; and (3) emergency tables when unexpected exposure times occur (up to 30 minutes above the maximum allowed working time).

⁶Kindwall, EP (1997). Compressed air tunneling and caisson work decompression procedures: development, problems, and solutions. Undersea and Hyperbaric Medicine, 24(4), pp. 337-345. This article reported 60 treated cases of DCI among 4,168 exposures between 19 and 31 p.s.i.g. over a 51-week contract period, for a DCI incidence of 1.44% for the decompression tables specified by the OSHA standard.

⁷Sealey, JL (1969). Safe exit from the hyperbaric environment: medical experience with pressurized tunnel operations. Journal of Occupational Medicine, 11(5), pp. 273-275. This article reported 210 treated cases of DCI among 38,600 hyperbaric exposures between 13 and 34 p.s.i.g. over a 32-month period, for an incidence of 0.54% for the decompression tables specified by the Washington State safety standards for compressed-air work, which are similar to the tables in the OSHA standard. Moreover, the article reported 51 treated cases of DCI for 3,000 exposures between 30 and 34 p.s.i.g., for an incidence of 1.7% for the Washington State tables.

⁸In 1985, the National Institute for Occupational Safety and Health (NIOSH) published a report entitled "Criteria for Interim Decompression Tables for Caisson and Tunnel Workers"; this report reviewed studies of DCI and other hyperbaric-related injuries resulting from use of OSHA's tables. This report is available on NIOSH's website: <http://www.cdc.gov/niosh/topics/decompression/default.html>.

⁹Anderson HL (2002). Decompression sickness during construction of the Great Belt tunnel, Denmark. Undersea and Hyperbaric Medicine, 29(3), pp. 172-188.

part of the construction. Anderson observed 6 DCS cases out of 7,220 decompression events, and reported that switching to the 1992 French Decompression tables reduced the DCI incidence to 0.08%. The DCI incidence in the study by H. L. Andersen is substantially less than the DCI incidence reported for the decompression tables specified in Appendix A. OSHA found no studies in which the DCI incidence reported for the 1992 French Decompression Tables were higher than the DCI incidence reported for the OSHA decompression tables, nor did OSHA find any studies indicating that the 1992 French Decompression Tables were more hazardous to employees than the OSHA decompression tables.¹⁰

Based on a review of available evidence, the experience of State-Plans that either granted variances (Nevada, Oregon, and Washington)¹¹ or promulgated a new standard (California)¹² for hyperbaric exposures occurring during similar subaqueous tunnel-construction work, and the information provided in the applicant's variance application, OSHA is issuing an interim order.

Under the interim order and variance application, instead of complying with the requirements of 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii), Tully will: (1) comply with the conditions listed below under "Specific Conditions of the Interim Order and the Application for a Permanent Variance" for the period between the date of this notice and completion of the New York Siphon Tunnel Project or the date OSHA

¹⁰Le Péchon JC, Barre P, Baud JP, Ollivier F (September 1996). Compressed air work - French tables 1992 - operational results. JCLP Hyperbarie Paris, Centre Medical Subaquatique Interentreprise, Marseille: Communication a l'EUBS, pp. 1-5 (see Ex. OSHA-2012-0036-0005).

¹¹These state variances are available in the docket: Exs. OSHA-2012-0035-0006 (Nevada), OSHA-2012-0035-0007 (Oregon), and OSHA-2012-0035-0008 (Washington).

¹²See California Code of Regulations, Title 8, Subchapter 7, Group 26, Article 154, available at <http://www.dir.ca.gov/title8/sb7g26a154.html>.

publishes its final decision on Tully’s application in the Federal Register; (2) comply fully with all other applicable provisions of 29 CFR part 1926; and (3) provide a copy of this Federal Register notice to all employees affected by the conditions, including the affected employees of other employers, using the same means it used to inform these employees of its application for a permanent variance. Additionally, this interim order will remain in effect until one of the following conditions occurs: (1) completion of the New York Siphon Tunnel Project; (2) OSHA publishes its final decision on the variance application in the Federal Register; or (3) OSHA modifies or revokes the interim order in accordance with 29 CFR 1905.13.

V. Specific Conditions of the Interim Order and the Application for a Permanent Variance

The following conditions apply to the interim order OSHA is granting to Tully. In addition, these conditions specify the alternative means of compliance with the requirements of paragraphs 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii) that the Tully is proposing for its permanent variance. The conditions apply to all employees of Tully/OHL USA Joint Venture exposed to hyperbaric conditions at the New York Siphon Tunnel Project. These conditions are:¹³

A. Scope

The interim order/permanent variance applies/would apply only to work:

¹³ In these conditions, the present tense form of the verb (e.g., “must”) pertains to the interim order, while the future conditional form of the verb (e.g., “would”) pertains to the application for a permanent variance (designated as “permanent variance”).

1. That occurs in conjunction with construction of the New York Siphon Tunnel Project, a subaqueous tunnel constructed using advanced shielded mechanical-excavation techniques and involving operation of an EPBTBM;
2. Performed under compressed-air and hyperbaric conditions up to 58 p.s.i.g.;
3. In the EPBTBM's forward section (the working chamber) and associated hyperbaric chambers used to pressurize and decompress employees entering and exiting the working chamber; and
4. Except for the requirements specified by 29 CFR 1926.803(e)(5), (f)(1), (g)(1)(iii), and (g)(1)(xvii), Tully must/would comply fully with all other applicable provisions of 29 CFR part 1926.

B. Application

The interim order/permanent variance applies/would apply only when Tully stops the tunnel-boring work, pressurizes the working chamber, and the CWAs either enter the working chamber to perform interventions (i.e., inspect, maintain, or repair the mechanical-excavation components), or exit the working chamber after performing interventions.

C. List of Abbreviations

Abbreviations used throughout this interim order/permanent variance include the following:

1. CAW – Compressed-air worker
2. CFR – Code of Federal Regulations
3. EPBTBM – Earth Pressure Balanced Tunnel Boring Machine
4. HOM – Hyperbaric Operations and Safety Manual

5. JHA – Job hazard analysis
6. OSHA – Occupational Safety and Health Administration
7. OTPCA – Office of Technical Programs and Coordination Activities

D. Definitions

The following definitions apply/would apply to this interim order/permanent variance. These definitions supplement the definitions in Tully’s project-specific HOM.

1. Affected employee or worker – an employee or worker who would be affected by the conditions of this interim order/permanent variance, or any one of his or her authorized representatives. The term “employee” has the meaning defined and used under the Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)
2. Atmospheric pressure – the pressure of air at sea level, generally 14.7 p.s.i.a., 1 atmosphere absolute, or 0 p.s.i.g.
3. Compressed-air worker – an individual who is specially trained and medically qualified to perform work in a pressurized environment while breathing air at pressures up to 58 p.s.i.g.
4. Competent person – an individual who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.¹⁴
5. Earth Pressure Balanced Tunnel Boring Machine – the machinery used to excavate the tunnel.

¹⁴Adapted from 29 CFR 1926.32(f).

6. Hot work – any activity performed in a hazardous location that may introduce an ignition source into a potentially flammable atmosphere.¹⁵

7. Hyperbaric – at a higher pressure than atmospheric pressure.

8. Hyperbaric intervention – a term that describes the process of stopping the EPBTBM and preparing and executing work under hyperbaric pressure in the working chamber for the purpose of inspecting, replacing, or repairing cutting tools and/or the cutterhead structure.

9. Hyperbaric Operations Manual – a detailed, project-specific health and safety plan developed and implemented by Tully for working in compressed air during the New York Siphon Tunnel Project.

10. Job hazard analysis – an evaluation of tasks or operations to identify potential hazards and to determine the necessary controls.

11. Man lock – an enclosed space capable of pressurization, and used for compressing or decompressing any employee or material when either is passing into or out of a working chamber.

12. Pressure – a force acting on a unit area. Usually expressed as pounds per square inch (p.s.i.).

13. p.s.i. – pounds per square inch, a common unit of measurement of pressure; a pressure given in p.s.i. corresponds to absolute pressure.

14. p.s.i.a – pounds per square inch absolute, or absolute pressure, is the sum of the atmospheric pressure and gauge pressure. At sea level, atmospheric pressure is

¹⁵Also see 29 CFR 1910.146(b).

approximately 14.7 p.s.i. Adding 14.7 to a pressure expressed in units of p.s.i.g. will yield the absolute pressure, expressed as p.s.i.a.

15. p.s.i.g. – pounds per square inch gauge, a common unit of pressure; pressure expressed as p.s.i.g. corresponds to pressure relative to atmospheric pressure. At sea level, atmospheric pressure is approximately 14.7 p.s.i. Subtracting 14.7 from a pressure expressed in units of p.s.i.a. yields the gauge pressure, expressed as p.s.i.g.

16. Qualified person – an individual who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience, successfully demonstrates an ability to solve or resolve problems relating to the subject matter, the work, or the project.¹⁶

17. Working chamber – an enclosed space in the EPBTBM in which CAWs perform interventions, and which is accessible only through a man lock.

E. Safety and Health Practices

1. Tully must/would develop and implement a project-specific HOM, and submit the HOM to OSHA at least six months before using the EPBTBM. Tully must/would receive a written acknowledgement from OSHA regarding the acceptability of the HOM.¹⁷ The HOM shall provide/would provide the governing safety and health requirements regarding hyperbaric exposures during the tunnel-construction project.

2. Tully must/would implement the safety and health instructions included in the manufacturer's operations manuals for the EPBTBM, and the safety and health instructions provided by the manufacturer for the operation of decompression equipment.

¹⁶Adapted from 29 CFR 1926.32(m).

¹⁷The grant of this interim order constitutes such acknowledgement by OSHA of the acceptability of the HOM provided by Tully for the New York Siphon Tunnel Project.

3. Tully must/would use air as the only breathing gas in the working chamber.
4. Tully must/would use the 1992 French Decompression Tables for air, air-oxygen, and oxygen decompression specified in the HOM, specifically the tables titled “French Regulation Air Standard Tables.”
5. Tully must/would equip man locks used by its employees with an oxygen-delivery system as specified by the HOM. Tully must/would not store oxygen or other compressed gases used in conjunction with hyperbaric work in the tunnel.
6. Workers performing hot work under hyperbaric conditions must/would use flame-retardant personal protective equipment and clothing.
7. In hyperbaric work areas, Tully must/would maintain an adequate fire-suppression system approved for hyperbaric work areas.
8. Tully must/would develop and implement one or more JHAs for work in the hyperbaric work areas, and review, periodically and as necessary (e.g., after making changes to a planned intervention that affects its operation), the contents of the JHAs with affected employees. The JHAs must/would include all the job functions that the risk assessment¹⁸ indicates are essential to prevent injury or illness.
9. Tully must/would develop a set of checklists to guide compressed-air work and ensure that employees follow/would follow the procedures required by this interim order/permanent variance (including all procedures required by the HOM, which this interim order/permanent variance incorporates/would incorporate by reference). The checklists must/would include all steps and equipment functions that the risk assessment

¹⁸See ANSI/AIHA Z10-2012, American National Standard for Occupational Health and Safety Management Systems, for reference.

indicates/would indicate are essential to prevent injury or illness during compressed-air work.

10. Tully must/would ensure that the safety and health provisions of the HOM adequately protect/would protect the workers of all contractors and subcontractors involved in hyperbaric operations.¹⁹

F. Communication

1. Prior to beginning a shift, Tully must/would implement a system that informs/would inform workers exposed to hyperbaric conditions of any hazardous occurrences or conditions that might affect their safety, including hyperbaric incidents, gas releases, equipment failures, earth or rock slides, cave-ins, flooding, fires, or explosions.

2. Tully must/would provide a power-assisted means of communication among affected workers and support personnel in hyperbaric conditions where unassisted voice communication is inadequate.

a. Tully must/would use an independent power supply for powered communication systems, and these systems must operate such that use or disruption of any one phone or signal location will not disrupt the operation of the system from any other location.

b. Tully must/would test communication systems at the start of each shift and as necessary thereafter to ensure proper operation.

G. Worker Qualifications and Training

Tully must/would:

¹⁹See ANSI/ASSE A10.33-2011, American National Standard for Construction and Demolition Operations – Safety and Health Program Requirements for Multi-Employer Projects, for reference.

1. Ensure that each affected worker receives/would receive effective training on how to safely enter, work in, exit from, and undertake emergency evacuation or rescue from, hyperbaric conditions, and document this training.

2. Provide effective instruction, before beginning hyperbaric operations, to each worker who performs/would perform work, or controls/would control the exposure of others, in hyperbaric conditions, and document this instruction. The instruction must/would include topics such as:

- a. The physics and physiology of hyperbaric work;
- b. Recognition of pressure-related injuries;
- c. Information on the cause, signs, and symptoms of decompression illness;
- d. How to avoid discomfort during compression and decompression; and
- e. Information the workers can use to contact the appropriate healthcare professionals should the workers have concerns that they may be experiencing adverse health effects from hyperbaric exposure.

3. Repeat the instruction specified in paragraph (b) of this condition periodically and as necessary (e.g., after making changes to its hyperbaric operations).

4. When conducting training for its hyperbaric workers, make this training available to OSHA personnel and notify the OTPCA at OSHA's national office and OSHA's Manhattan Area Office before the training takes place.

H. Inspections, Tests, and Accident Prevention

1. Tully must/would initiate and maintain a program of frequent and regular inspections of the EPBTBM's hyperbaric equipment and support systems (such as

temperature control, illumination, ventilation, and fire-prevention and fire-suppression systems), and hyperbaric work areas, as required under 29 CFR 1926.20(b)(2) by:

- a. Developing a set of checklists to be used by a competent person in conducting weekly inspections of hyperbaric equipment and work areas; and
- b. Ensuring that a competent person conducts daily visual checks and weekly inspections of the EPBTBM.

2. If the competent person determines that the equipment constitutes/would constitute a safety hazard, Tully must/would remove the equipment from service until it corrects the hazardous condition and has the correction approved by a qualified person.

3. Tully must/would maintain records of all tests and inspections of the EPBTBM, as well as associated corrective actions and repairs, at the job site for the duration of the job.

I. Compression and Decompression

Tully must/would consult with its attending physician concerning the need for special compression or decompression exposures appropriate for CAWs not acclimated to hyperbaric exposure.

J. Recordkeeping

In addition to the requirements of 29 CFR part 1904 (Recording and Reporting Occupational Injuries and Illnesses), Tully must/would maintain records of:

1. The date, times, and pressure for each hyperbaric intervention.
2. The name of each individual worker exposed to hyperbaric pressure and the decompression protocols and results for each worker.

K. Notifications

1. To assist OSHA in administering the conditions specified herein, Tully must/would:

a. Notify the OTPCA and the Manhattan Area Office of any injury, illness, or fatality resulting from exposure of an employee to hyperbaric conditions within 8 hours of the incident, and provide a copy of the incident investigation within 24 hours of the incident. The incident-investigation report must include a root-cause determination, and the preventive and corrective actions identified and implemented.

b. Provide certification within 15 days of the incident that it informed affected workers of the incident and the results of the incident investigation (including the root-cause determination and preventive and corrective actions identified and implemented).

c. Notify the OTPCA and the Manhattan Area Office within 15 working days and in writing, of any change in the compressed-air operations that affects Tully's ability to comply with the conditions specified herein.

d. Upon completion of the New York Siphon Tunnel Project, evaluate the effectiveness of the decompression tables used throughout the project, and provide a written report of this evaluation to the OTPCA and the Manhattan Area Office.

e. To assist OSHA in administering the conditions specified herein, inform the OTPCA and the Manhattan Area Office as soon as possible after it has knowledge that it will:

i. Cease to do business;

ii. Change the location and address of the main office for managing the tunneling operations specified herein; or

iii. Transfer the operations specified herein to a successor company.

f. Notify all affected employees of this interim order/permanent variance by the same means required to inform them of its application for a variance.

2. OSHA must/would approve the transfer of this interim order/permanent variance to a successor company.

Authority and Signature

David Michaels, PhD, MPH, Assistant Secretary of Labor for Occupational Safety and Health, 200 Constitution Avenue, NW., Washington, DC 20210, authorized the preparation of this notice. Accordingly, the Agency is issuing this notice pursuant to Section 29 U.S.C. 655(6)(d), Secretary of Labor's Order No. 1-2012 (77 FR 3912, Jan. 25, 2012), and 29 CFR 1905.11.

Signed at Washington, DC, on January 2, 2014.

David Michaels,
Assistant Secretary of Labor for Occupational Safety and Health.

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